

PENNSYLVANIA RAILROAD:
MANTUA JUNCTION VIADUCT
Spanning Schuylkill River,
North of Girard Avenue Bridge
Philadelphia
Philadelphia County
Pennsylvania

HAER No. PA-37

HAER
PA,
51-PHILA,
695-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Department of the Interior
Washington, DC 20013-7127

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HISTORIC AMERICAN ENGINEERING RECORD

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INVENTORY OF PHOTOGRAMMETRIC IMAGES

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- 6 5" x 7" glass plate negatives (one stereopair with one extra plate, and one stereotriplet) produced by Perry E. Borchers of the Ohio State University in 1971.

One survey control contact print from each plate; survey control information for each triplet.

LC-HAER-GS05-B-1971-401L *	DIAGONAL VIEW ON EAST BANK FROM SOUTH OF BRIDGE--LEVEL
LC-HAER-GS05-B-1971-401R	DIAGONAL VIEW ON EAST BANK FROM SOUTH OF BRIDGE--LEVEL
LC-HAER-GS05-B-1971-401RC	DIAGONAL VIEW ON EAST BANK FROM SOUTH OF BRIDGE--LEVEL
	401L and 401RC overlap: 95%
	401R and 401RC overlap: 95%
LC-HAER-GS05-B-1971-402L *	VIEW ON EAST BANK FROM NORTH OF BRIDGE--LEVEL
LC-HAER-GS05-B-1971-402R	VIEW ON EAST BANK FROM NORTH OF BRIDGE--LEVEL
LC-HAER-GS05-B-1971-402R (extra)	VIEW ON EAST BANK FROM NORTH OF BRIDGE--LEVEL
	402L and 402R overlap: 95%

PENNSYLVANIA RAILROAD:
MANTUA JUNCTION VIADUCT
HAER No. PA-37
Data (Page 2)

- 2 Stereopairs of master contact prints 2.5" x 2.5" mounted on 5" x 7" cardstock, and
- 3 5" x 7" master contact prints mounted on cardstock.

No original negatives; no survey control information. Overlap not calculated. Copy prints and copy negatives have been made from each image.

- LC-HAER-PS13-2000-501 * VIEW FROM EAST BANK LOOKING SOUTH, SHOWING LANDED ARCHES AND FIRST RIVER ARCH ON UPSTREAM SIDE OF BRIDGE.
- LC-HAER-PS13-2000-502 * VIEW FROM EAST SIDE OF RIVER LOOKING NORTH, SHOWING SCHUYLKILL PARKWAY PASSING UNDER ARCHES OF BRIDGE.
- LC-HAER-PS13-2000-503 * VIEW FROM EAST BANK LOOKING NORTH, SHOWING FIRST THREE RIVER ARCHES ON DOWNSTREAM SIDE OF BRIDGE.
- LC-HAER-PS13-2000-504 * CLOSE-UP VIEW FROM EAST SIDE OF RIVER LOOKING SW, SHOWING UNDERSIDE OF SCHUYLKILL PARKWAY ARCH.
- LC-HAER-PS13-2000-505 * VIEW FROM EAST BANK OF RIVER LOOKING WEST, SHOWING DETAIL OF CUTWAERS ON UPSTREAM SIDE OF PIERS.

PROJECT INFORMATION STATEMENT

Photogrammetric images were incorporated into the HABS/HAER collections in the summers of 1985 and 1986. Inventories of the images were compiled and filed as data pages for each structure recorded. Since the glass photogrammetric plates are not reproducible except with special permission, a reference print and film copy negative were made from one plate of each stereopair and from the most informative plates in sequential sets. The reference prints and copy negatives were then incorporated into the formal HABS/HAER photograph collections.

**PENNSYLVANIA RAILROAD:
MANTUA JUNCTION VIADUCT
HAER No. PA-37
Data (Page 3)**

The Photogrammetric Images Project was a cooperative endeavor between the HABS/HAER Division of the National Park Service and the Prints and Photographs Division of the Library of Congress. The reference prints and film copy negatives of the original plates were made by the Library of Congress Photoduplication Service with funds provided by the Library of Congress Flat Film Preservation Fund. Additional reproductions were made by HABS/HAER. The project was supervised by HABS/HAER Architect John A. Burns, AIA, and completed by HABS Historians Jeanne C. Lawrence (University of London) in 1985 and Caroline R. Alderson (Columbia University) in 1986.

CONNECTING RAILWAY, SCHUYLKILL RIVER BRIDGE
(Pennsylvania Railroad, Mantua Junction Viaduct)
(New York Division, Bridge No. 69)
Pennsylvania Historic Railroad Bridges Recording Project
Spanning Schuylkill River, north of Girard Ave. Bridge
Philadelphia
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ADDENDUM TO
PENNSYLVANIA RAILROAD, MANTUA JUNCTION VIADUCT
Spanning Schuylkill River, north of Girard Ave. Bridge
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Philadelphia County
Pennsylvania

PHOTOCRAPHS

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695-

HAER No. PA-37
(Page 4)

HISTORIC AMERICAN ENGINEERING RECORD

CONNECTING RAILWAY, SCHUYLKILL RIVER BRIDGE

(Pennsylvania Railroad, Mantua Junction Viaduct)

(New York Division, Bridge No. 69)

ADDENDUM TO

PENNSYLVANIA RAILROAD, MANTUA JUNCTION VIADUCT

This report supplements three (3) data pages previously transmitted to the Library of Congress.

The new record name reflects the structure's historic name.

Location: Spanning Schuylkill River, north of Girard Ave. Bridge, Philadelphia, Philadelphia County, Pennsylvania.

USGS Quadrangle: Philadelphia, Pennsylvania-New Jersey (7.5-minute series).

UTM Coordinates: 18/483400/4424920

Dates of Construction: 1866-67.

Basis for Dating: Secondary sources.

Dates of Alteration: 1873, 1897, 1912-15.

Designers: John A. Wilson (Chief Engineer, Connecting Railway Co.), original; Alexander C. Shand (Chief Engineer, Pennsylvania Railroad), reconstruction.

Builders: Thomas Seabrook, original; Eyre Shoemaker, Inc., and Reiter, Curtis & Hill (both of Philadelphia), reconstruction.

Present Owner: National Railroad Passenger Corporation (Amtrak).

Present Use: Railroad bridge.

Structure Types: Stone arch, concrete arch, deck girder.

Significance: Completed in 1867, the Connecting Railway's Schuylkill River bridge forms an important link in a direct rail route between West

Philadelphia and New York City. The Pennsylvania Railroad maintained its original appearance during an early twentieth-century reconstruction, using stone arch construction despite the growing popularity of reinforced concrete. The bridge is located in Fairmount Park, a National Register-listed historic district.

Historian: Justin M. Spivey, April 2001.

Project Information: The Historic American Engineering Record (HAER) conducted the Pennsylvania Historic Railroad Bridges Recording Project during 1999 and 2000, under the direction of Eric N. DeLony, Chief. The project was supported by the Consolidated Rail Corporation (Conrail) and a grant from the Pennsylvania Historical and Museum Commission (PHMC). Justin M. Spivey, HAER engineer, researched and wrote the final reports. Preston M. Thayer, historian, Fredericksburg, Virginia, conducted preliminary research under contract. Jet Lowe, HAER photographer, and Joseph E. B. Elliott, contract photographer, Sellersville, Pennsylvania, produced large-format photographs.

Description and History

The connection of Philadelphia and New York by rail was an early goal of the Philadelphia & Trenton Railroad (P&T), which, along with the Camden & Amboy Railroad of New Jersey, began offering through service in 1840. At Philadelphia, however, the Schuylkill River remained a major obstacle to west- and southbound rail traffic until after the Civil War.¹ The Connecting Railway, founded in 1863, constructed a 6.75-mile link between West and North Philadelphia with financial support from the Pennsylvania Railroad (PRR). From the PRR's Mantua yard, the new Connecting Railway crossed the Schuylkill and headed northeast to meet the P&T. Opened to traffic on 2 June 1867, it closed a major gap in the PRR system, eliminating a circuitous detour between West Philadelphia and the Hudson River waterfront opposite New York City. The Connecting Railway was initially leased to the P&T, then an independent company. In December 1871, however, PRR acquired the P&T by lease.² Although the Connecting Railway kept separate records and solicited its own contracts for improvements well into the twentieth century, the line was operated as part of PRR's New York Division.

Because the Connecting Railway's Schuylkill River crossing is such a visual landmark in Philadelphia, its evolution has been well-documented in paintings, engravings, and photographs. Among the most famous depictions of the original bridge is Thomas Eakins' 1871 painting, "Max Schmitt in a Single Scull," which hangs in New York's Metropolitan Museum of Art. The nascent art of photography also captured the bridge in its unaltered form, with several images by James Cremer currently located in the Fairmount Park Commission archives.³

John A. Wilson, Chief Engineer of the Connecting Railway, likely designed the Schuylkill River bridge and other structures when he surveyed the line in late 1863. The railroad was initially elevated above city streets for a significant portion of its length. The Schuylkill River bridge included spans over Girard Avenue and Fairmount Park drives along the river banks, with a separate bridge over the Philadelphia & Reading Railroad (P&R) tracks immediately to the north. On 9 March 1864, the same day that the railroad's directors awarded Thomas Seabrook a contract "for the masonry required to be constructed along the entire line of the road," they also read Wilson's letter of resignation.⁴ Wilson had taken a job with the P&R, and was replaced by George B. Roberts, who oversaw the railroad's construction during 1866 and 1867. The Schuylkill River bridge appears complete in a January 1867 photograph presented by Roberts to Gustavus A. Nicolls, General Superintendent of the P&R.⁵

The current stone arch bridge, despite its resemblance to the 1867 structure, largely dates from a major reconstruction completed in 1915. During the interim period, the bridge underwent a number of lesser alterations to increase its load-carrying capacity. A metal truss span over the river's main channel was the primary reason for the frequent rebuilding. The original design had three 70'-0" arch spans in this location, but they were omitted and a cast- and wrought-iron, arch-reinforced, double-intersection Whipple truss built instead.⁶ In its original configuration, the bridge included:

- three wrought-iron deck girder spans over Girard Avenue,
- five 21'-0" stone-faced brick arch spans over Lansdowne Drive,
- four 60'-0" stone-faced brick arch spans separated by 7'-0" piers,
- the 236'-3" Whipple truss,
- three 60'-0" stone-faced brick arch spans separated by 7'-0" piers,
- and three 14'-0" stone-faced brick arch spans.⁷

In 1873, the Connecting Railway decreased the truss span slightly by doubling the thickness of the stone piers at either end.⁸ The reinforcing arch may have been removed at this point, as it does not appear in later photographs of the bridge. When the Whipple truss could no longer carry increasing train loads, the railroad constructed a Pratt truss of identical length on wooden scaffolding adjacent to the bridge. On 17 October 1897, crews shifted the old truss out of the way and the new truss into its place, accomplishing the task in less than two and a half minutes.⁹

Increasing traffic during the early twentieth century led the PRR to consider widening its New York Division from two to four tracks, with a fifth track near downtown Philadelphia. A resolution of the Connecting Railway directors, passed on 27 March 1912, was consistent with this plan. The railroads subsequently began negotiations with the Fairmount Park Commission, agreeing in December 1913 to trade land along the PRR's Chestnut Hill branch for additional Connecting Railway right-of-way.¹⁰ In addition to the Schuylkill River bridge's prominent location, involvement of the Fairmount Park Commission, among other city authorities, may have influenced the decision to build in stone, at a time when railroads frequently added concrete

arch extensions to existing masonry bridges. A contemporary article in *Engineering Record* remarked on the "unusual" substitution, explaining that stone arch rings with an unreinforced concrete backing also made for quicker and less expensive construction than reinforced concrete arches.¹¹ Plans for the bridge, prepared under the direction of PRR Chief Engineer Alexander C. Shand, entailed adding three tracks' worth of Clearfield County sandstone arches on the north side. Shand decided on two 103'-0" spans with a single 22'-0" pier at mid-river, rather than the three 70'-0" spans of Wilson's design, to reduce foundation work. He planned to build the new mid-river pier the full width of the bridge, under the existing deck truss, which would be replaced with stone arches at a later date.¹² A separate contract covered the spans crossing Landsdowne Drive and Girard Avenue.

The addition duplicated the dimensions of the 1867 arch spans, which varied erratically from 60'-0" to 60'-8", because the original intention was to keep the existing stonework on the south side. The contract for the river spans went to Eyre Shoemaker, Inc., of Philadelphia, which began construction in October 1912. As work progressed in 1913, *Railway Age Gazette* glibly reported that "the old structure was found to be in very good condition, and with some minor repairs, the masonry will be good for many more years of service."¹³ This turned out not to be the case. The contractor had trouble building up against the old arches, which had been damaged by pier settlement. After completing new arches two tracks wide, Eyre Shoemaker tore down and rebuilt the old arches, effectively constructing a new five-track bridge.¹⁴

During the same construction campaign, Philadelphia contractors Reiter, Curtis & Hill completely rebuilt the spans crossing Landsdowne Drive and Girard Avenue. Because of their location over a park road and important street, respectively, the Philadelphia city government played a large role in the design. *Engineering Record* noted the Department of Public Works and Bureau of Surveys' involvement, and that "the ornamental features were designed in conformity with the suggestions of the City Art Commission."¹⁵ The results were two 45'-0" reinforced concrete arch spans over Landsdowne Drive and a concrete-encased deck girder bridge over Girard Avenue, with spans of 32'-0", 68'-0", 68'-0", and 32'-0". Brann & Stuart erected the steel girders for the latter. Precast concrete balustrades and ceramic tile panels provided a uniform appearance, earning praise from city papers and the national engineering press.¹⁶ PRR declared the entire structure complete on 28 January 1915, and other than the installation of overhead catenary wires, it has been little altered since. Amtrak Northeast Corridor and Southeastern Pennsylvania Transportation Authority (SEPTA) R7 and R8 passenger trains currently use the bridge.

CONNECTING RAILWAY, SCHUYLKILL RIVER BRIDGE
HAER No. PA-37
(Page 8)

Notes

1. James E. Vance, Jr., *The North American Railroad: Its Origin, Evolution, and Geography* (Baltimore: Johns Hopkins Univ. Press, 1995), 113.
2. Howard W. Schotter, *The Growth and Development of the Pennsylvania Railroad Company: A Review of the Charter and Annual Reports of the Pennsylvania Railroad Company 1846 to 1926* (Philadelphia: Press of Allen, Lane, and Scott, 1927), 61, 75, 97-98.
3. The author is grateful to Kristin Cardi of the Philadelphia Historical Commission for calling the painting to his attention. For an early photograph, see James Cremer, "View from Sedgely," Stereo View No. 102, in Girard Avenue Bridge file, Fairmount Park Commission Archives, Philadelphia, Pa.
4. Connecting Railway Company, *Minute Book No. 1*, 10, in Box 94, Pennsylvania Railroad Records, Urban Archives, Paley Library, Temple University, Philadelphia, Pa.
5. The photograph is inscribed, "To G. A. Nicolls, Esq., with Compliments of G. B. Roberts, March 26, 1867." See "Connecting R. Rd. Bridge, over Schuylkill River, near Philada. January, 1867. Centre Span of Iron Truss, 262-1/2 feet," in Large Drawer 2528, Railroad Museum of Pennsylvania, Pennsylvania Historical and Museum Commission, Strasburg, Pa.
6. "Schuylkill River Bridge," *Railway and Locomotive Engineering* 19, No. 5 (May 1906): 194.
7. Dimensions compiled from James D. Lynch, Jr., "Schuylkill River Bridge at Girard Avenue," *High Line* 6, Nos. 1-2 (Autumn-Winter 1985): 18; and S. N. Sloan, "Pennsylvania Railroad Company's Bridge over the Schuylkill River, Philadelphia, Pa.," *Concrete-Cement Age* (Jul. 1914): 12-15. It is worth mentioning that an 1870s engraving of the bridge shows, perhaps fancifully, through trusses over Girard Avenue. See "From New York to the Centennial: Scenes Along the Pennsylvania Railroad," *Frank Leslie's Illustrated Newspaper* 42, No. 1073 (22 Apr. 1876): 109.
8. Lynch, "Schuylkill River Bridge," 15.
9. A number of sources describe the replacement, including: "Bridge 69, New York Division, Pennsylvania Railroad," *Engineering Record* 39, No. 17 (25 Mar. 1899): 371-72; "Erection of Bridge 69, Pennsylvania Railroad," *Engineering Record* 39, No. 21 (22 Apr. 1899): 466-70; Joseph T. Richards, "Replacement of the Old Metal-Span of the Pennsylvania Railroad Bridge over the Schuylkill River at Philadelphia, October 17, 1897," *Proceedings of the Engineers' Club of Philadelphia* 14, No. 4 (Apr. 1898): 302-09; and Joseph W. Wagner, "Replacing Bridge No. 69, Pennsylvania R. R., near Girard Ave., Philadelphia," *Engineering News* 38, No. 17 (21 Oct. 1897): 258-59.
10. Connecting Railway, *Minute Book No. 1*, 399; cf. Fairmount Park Commission, *Meeting Minutes*, 12:178, 12:286-87, transcript in folder "Railroads in Park - General," Fairmount Park Commission Archives, Philadelphia, Pa.
11. "Schuylkill River Railroad Bridge," *Engineering Record* 69, No. 7 (14 Feb. 1914): 196.
12. Sloan, "Pennsylvania Railroad Company's Bridge," 12.
13. "Schuylkill River Bridge Improvements," *Railway Age Gazette* 55, No. 25 (19 Dec. 1913): 1173.

CONNECTING RAILWAY, SCHUYLKILL RIVER BRIDGE
HAER No. PA-37
(Page 9)

14. Lynch, "Schuylkill River Bridge," 19-21.
15. "Artistic Masks for Ugly Bridges," *Engineering Record* 68, No. 15 (11 Oct. 1913): 402.
16. Fairmount Park Guard Pension Fund Association, *Souvenir of Fairmount Park* (Manayunk, Pa.: Reichert & Co., 1914), 79, in Fairmount Park Commission Archives, Philadelphia, Pa.; "Esthetic Bridge Design, P. R. R," editorial in *Railway and Engineering Review* 53, No. 48 (29 Nov. 1913): 1097.

Additional Sources

1. U.S. Department of the Interior, HAER No. PA-71, "Northeast Railroad Corridor," 1977, Prints and Photographs Division, Library of Congress, Washington, D.C. See photographs PA-71-21 and PA-71-22 for aerial coverage of the Mantua Junction Viaduct.
2. Milepost 87.14, region/division/branch 691101, aperture card files, Consolidated Rail Corp., Philadelphia, Pa. [transferred to Norfolk Southern Railway Co., Atlanta, Ga.].
3. National Railroad Passenger Corporation (Amtrak) archives, Philadelphia, Pa.